



Modern Forecasting and (Policy) Analysis System

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Background

- Central Bank of Sri Lanka (CBSL) is very likely to adopt inflation targeting in 2020 (it is also a structural criteria under the IMF program)
- This will change the way the CBSL implements monetary policy and how it communicates with the markets and public
- Pricing of financial assets will be affected as the short-term interest rates become the CBSL's main operational target in targeting inflation
- Inflation targeting requires capacity to forecast inflation and other economic variables and assess whether interest rates are in line with policy objectives (inflation between 4-6%)
- CBSL uses a forecasting and policy analysis system as the technology supporting inflation targeting

What is a forecasting and policy analysis system (FPAS)?

FPAS is a system that helps CBSL deliver a consensual, evidence-based (data-driven) view on current and future economic developments, vulnerabilities, risks, and policy options for monetary policy strategy (interest and exchange rates).

FPAS consists of software, analytical technology, staff specialized skills, organization of processes and communication strategies.

Why CAL may want to have an FPAS?

- CBSL has FPAS. Adopting a similar or same system will allow CAL anticipate future trends in interest rates. It will give you a competitive advantage in think like a CBSL.
- Support of your existing business – Specifically, research team will gain the capability to formulate an independent, economically consistent, numerical forecast about the economy for 3 years out; assess alternative development scenarios; conduct stress testing – inform fixed income strategies, valuation of assets, and risk management,
- Reputation and credibility.

Outline

1. Principles of inflation (forecast) targeting
 - i. Historical background why central banks move to inflation targeting
 - ii. Characteristics of inflation forecast targeting
 - iii. Design issues
 - iv. Implementation issues
2. Elements of forecasting and policy analysis system
 - i. Technology
 - ii. Staff capacity for macroeconomic analysis and forecasting



Inflation (forecast) targeting



Historical background

Why do central banks adopt forward-looking monetary policy?

“If we wait until a price movement is actually afoot before applying remedial measures, we may be too late.”

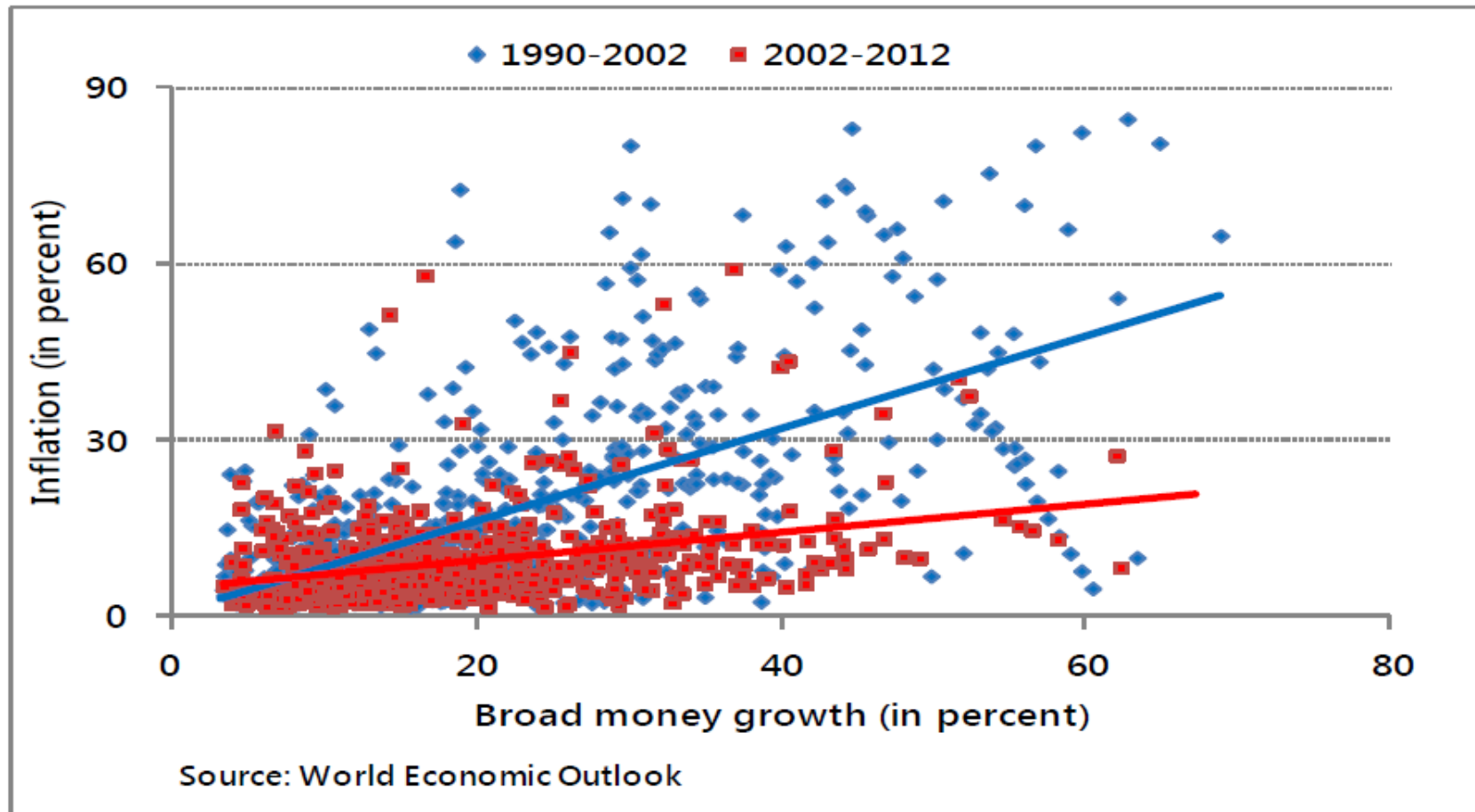
Keynes (1923)

Emergence of inflation targeting in advanced and emerging market countries

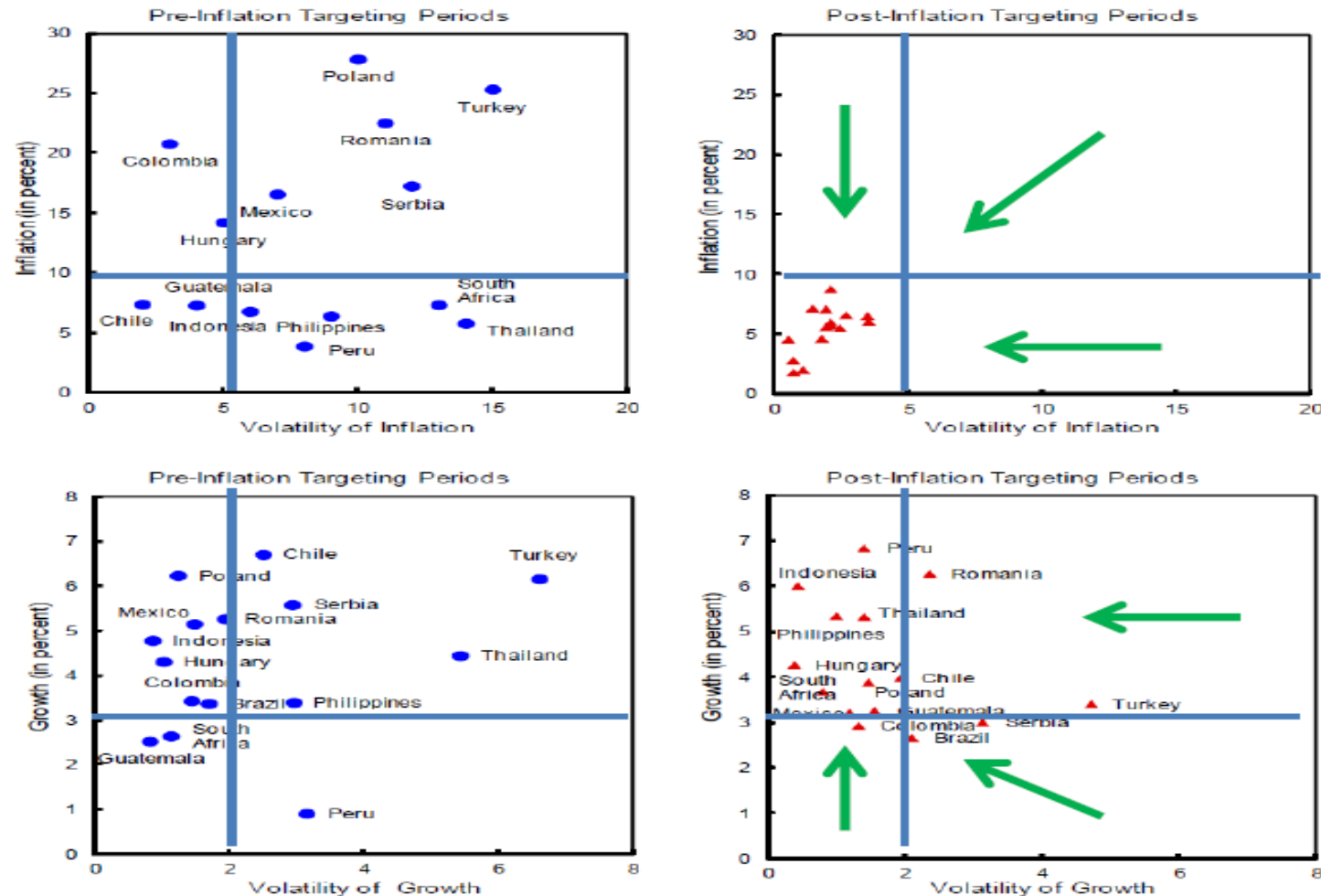
- IT developed pragmatically
- Country-specific experiences
 - Canada and New Zealand failed with money targeting in 1980s
 - Collapse of ERM led Bank of England to join club in the 1993
 - Collapse of fixed exchange rate in Czech Republic in 1997
 - Asia financial crisis in 1997 – ASEAN-5 countries
- Theoretical foundations in the late 1990s (Svensson, 1997, 2000)

Inflation forecast targeting introduced as relationship between money growth and inflation weakened

Figure 4. The Relation Between Broad Money Growth and Inflation, 1990–2012



Hard country evidence shows that economic performance under inflation targeting improves – inflation, growth and interest rates become less volatile; economic growth increases





Characteristics of inflation forecast targeting

What is inflation forecast targeting?



- Central Bank or Government sets inflation target



- CB forecasts economy and inflation



- **Forecast becomes CB's intermediate target**



- Forecast used to communicate how manage tradeoffs (output, inflation, financial stability)



- These factors determine speed inflation forecast returns to target

Principles of inflation forecast targeting

1. Primary role of monetary policy: provide nominal anchor, other objectives must not be inconsistent with this
2. Effective IFT reduces uncertainty, anchors inflation expectations, improves pricing of financial assets and reduces severity of economic booms and busts
3. Support of other policies: fiscal and macro prudential
4. Keeping forecast path of inflation close to target: not possible or desirable to keep inflation exactly on target
5. Clear objectives and central bank independence
6. Monitoring and accountability

Pros and Cons of IFT

Advantages

- Improves macroeconomic resilience
- A nominal anchor with flexible ER as a shock absorber
- Allows an independent monetary policy for stabilization purposes
- Anchors inflation expectations
- Intuitive to understand: an inflation target and an instrument (interest rate)
- Fosters transparency and accountability of CBSL

Challenges and risks

- Nominal (and real) exchange rate may be volatile
- Fear of floating or “excessive” appreciation may reduce stabilizing power of exchange rate
- Emphasis on price stability may run counter to other goals of a central bank
- Requires working link from policy rates to interbank rate to long-term interest rate
- Fiscal dominance may undermine price stability unless central bank is independent

Escape clauses for missing inflation targets

Attempts at price stability would cause volatility of output and employment

No response to the primary impacts of shocks that cause inflation and GDP moving in opposite directions

Apply an escape clause and explain the temporary deviation of the inflation forecast from the target

Examples:
Changes to indirect taxes, terms of trade, govt. charges, or natural disasters



Design issues

Inflation target design

IT as a communication device

How is target defined?

Level

- numerical definition of price stability
 - non-zero because of measurement bias in the CPI
 - dangers of low target—hit zero bound in global crisis
 - real and welfare costs of inflation
-
- CBSL has yet to explicitly announce a level target.

How is target defined? (cont.)

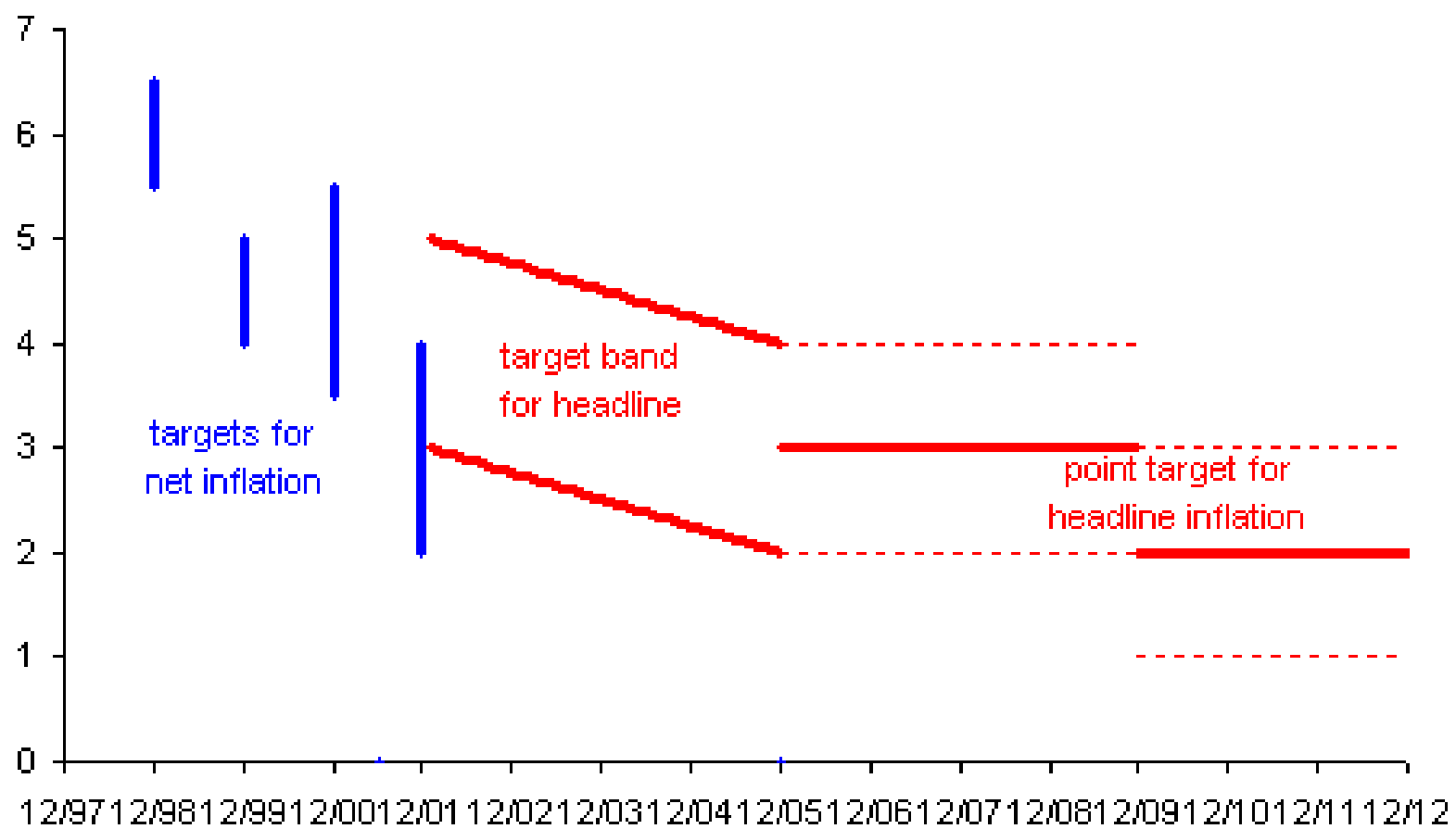
Width—most express target as point with tolerance band (CBSL: 4-6%)

Horizon

- choice depends on transmission lags and preferences about inflation *versus* output stabilization
- “medium term” language
- Effective monetary policy horizon in Ghana: 3 – 8 quarters

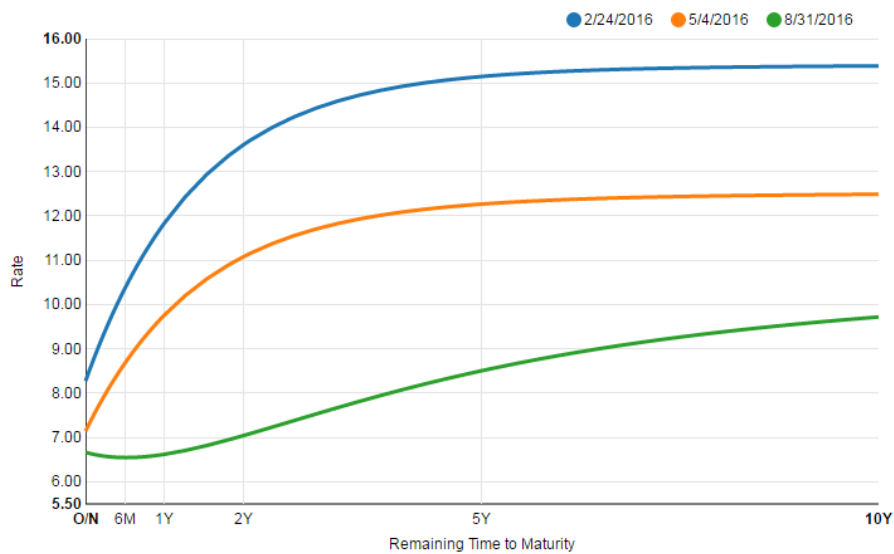
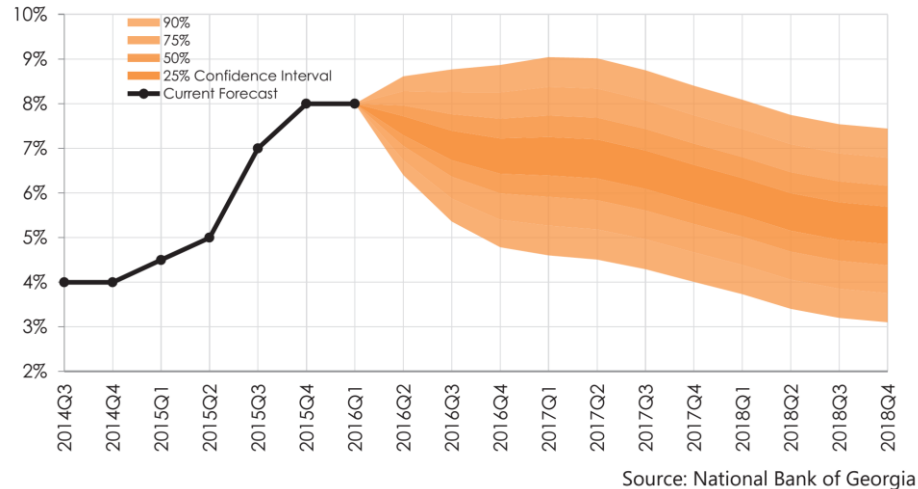
Variable —typically headline CPI but “core” CPI often used as indicator

Possible definitions of inflation targets



Short-term interest rates become the main policy instrument.
Forward guidance about future policy rates gives CBs a leverage on the level of long-term interest rates.
Example from Georgia:

Figure 2.10 Forecast of the Monetary Policy Rate



- In May 2016, National Bank of Georgia started to publish a future path of policy rate
- After the publication, the yield curve inverted.
- As policy rate path showed declining trend in policy rate market translated this into longer term interest rates that went below the policy rate.

IFT as a communication device

What information CBs need to communicate?

- Inflation target and policy strategy (typically, its expectations about short-term interest rates)
- Current and expected outlook for the economy
- Reports and analyses of inflation indicators
 - Incl. central bank's forecasts
- “Progress reports,” reasons for missing the targets
- Effective communication can help anchor expectations

How to communicate?

- Speeches, press conferences, testimony
- Statistical releases, publications, WEB
- Educate to financial literacy

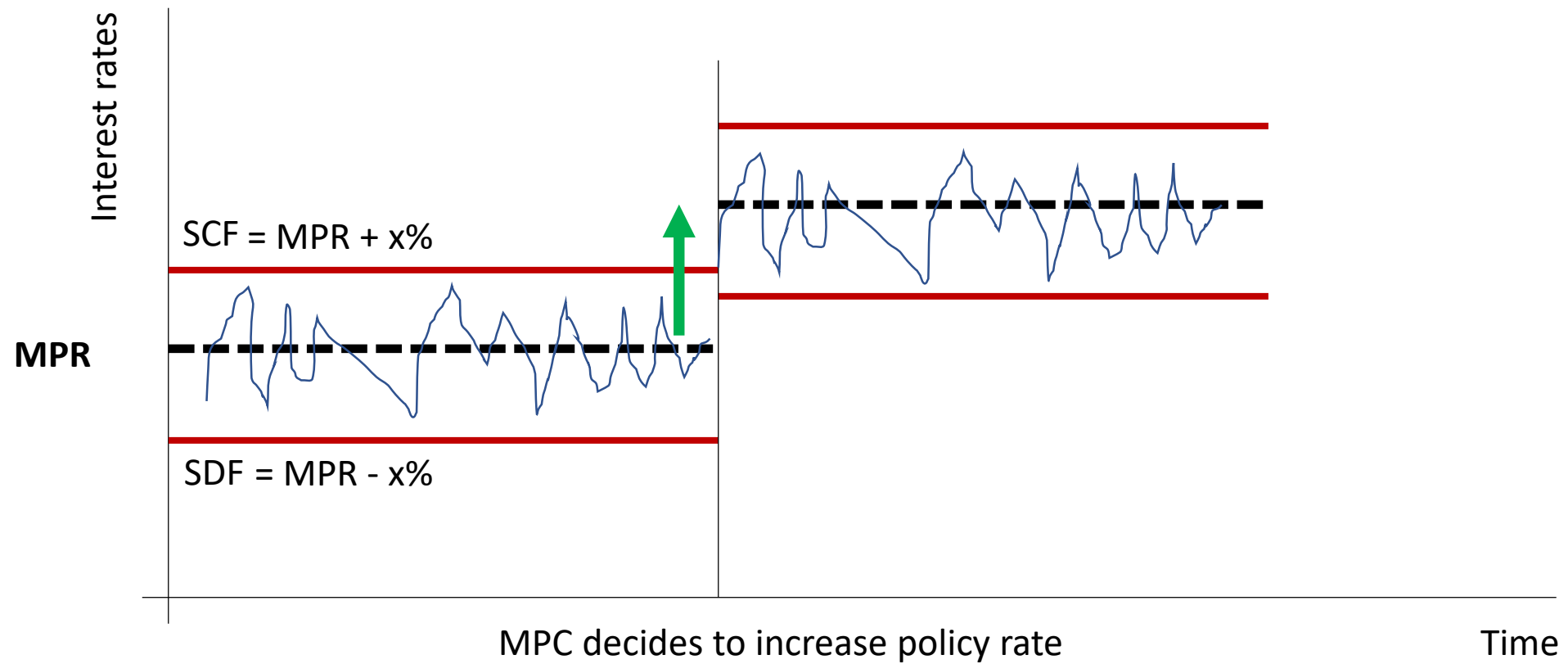


Implementation of monetary policy under IFT

Interest rates become the main policy instrument

CBs target the level of short-term interest rates

Implementation of MPC's decisions



Components of overnight market infrastructure

- Interest rate corridor
 - Indicative interest rate target (monetary policy rate as pricing benchmark)
 - Standing deposit facility
 - Standing lending facility
- Liquidity management instruments
 - Short-term liquidity tools: 1/2wks CBSL's bills
 - OMO auctions: repo/rev-repo operations
 - (Long-term liquidity)

Main takeaways

- Price stability is the main objective of CB's monetary policy
- Forward-looking framework is a natural option for modernization as other frameworks broke down
- IFT goes hand in hand with a flexible exchange rate
- Forward-looking framework requires capacity to
 - forecast inflation and other economic variables
 - assess whether monetary policy is in line with objectives
 - effectively adjust monetary policy instruments
 - communicate clearly



Forecasting and policy analysis system

Technological components

1. Single analytical software platform
2. Data management system
3. Data monitoring and diagnostics system
4. Near-term forecasting system
5. Medium-term forecasting system
6. Reporting system

Organization and processes to ensure that FPAS underpins decision-making

1. Data analysis and forecasting processes
2. Forecasting team
3. Work-flow timing (Forecasting calendars)
4. Meetings and communication

Good data warehousing system is essential foundation for FPAS automation in the future



DATAWAREHOUSE



Data monitoring system

Near-term forecasting system

Medium-term forecasting system

Reporting system

Data monitoring system

- Macro diagnostics dashboards
- Main sectors covered:
 - Consumer prices
 - Real sector
 - Financial sector
 - Monetary sector
 - External sector
 - Trading partners
 - Commodity prices
 - Fiscal policy stance
 - Monetary conditions and monetary policy stance

Near-term forecasting system

A portfolio of **univariate models**

- Time-series models (ARIMA(X), SARIMA, GARCH, STAR)
- Single-equation models
- Linear/non-linear models

multivariate models

- VAR, SVAR, VEC, BVAR, MIDAS
- Dynamic factor models
- Systems of simultaneous equations

Examples of NTF outputs

Date		OCR Review Dates					End of Year	
		9 June	11 Aug	22 Sep	10 Nov	9 Feb	2017	2018
31 Mar	OCR target (28 April review) [%, p.a.]	2.3	2.3	2.3	2.2	2.2	2.1	2.1
Probability of OCR cut to 2% or below [%]								
31 Mar	Baseline	35	41	41	44	44	47	47
6 Apr	ANZ Commodity price index	48	56	56	57	57	58	54
12 Apr	Capital utilisation (manufacturing and construction)	50	56	56	57	55	53	51
18 Apr	Consumption price index	48	54	54	55	55	56	53
21 Apr	Net permanent migration	47	54	54	55	54	56	52
26 Apr	National accounts	47	54	54	55	54	56	52
27 Apr	Merchandise trade balance	47	54	54	55	54	56	52
Average estimate		42	48	48	49	48	49	46
Difference between last and baseline estimates		13	13	13	10	9	8	5

Medium-term forecasting system

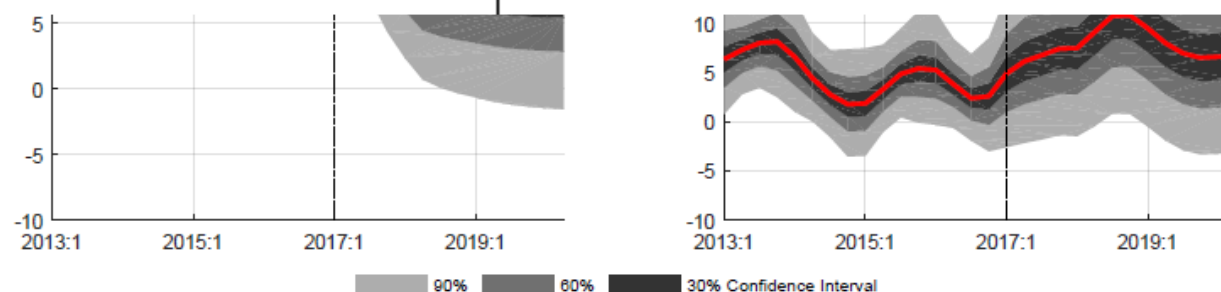
- Enables economically consistent projections (core one in a suite of models)
 - Designed to tell a story – not a black box
 - Builds on existing near-term forecasts (produced by experts, includes judgement)
- **Structural economic model – backbone of FPAS**
- Allows to model the Sri Lankan economy and CBSL's behavior
 - Aggregate demand block, fiscal impulse, foreign exchange intervention etc.
 - Suited for noisy and limited data
- Allows for risk analysis and discussion of uncertainty
- Allows for scenarios and policy experiments

Example of forecast output

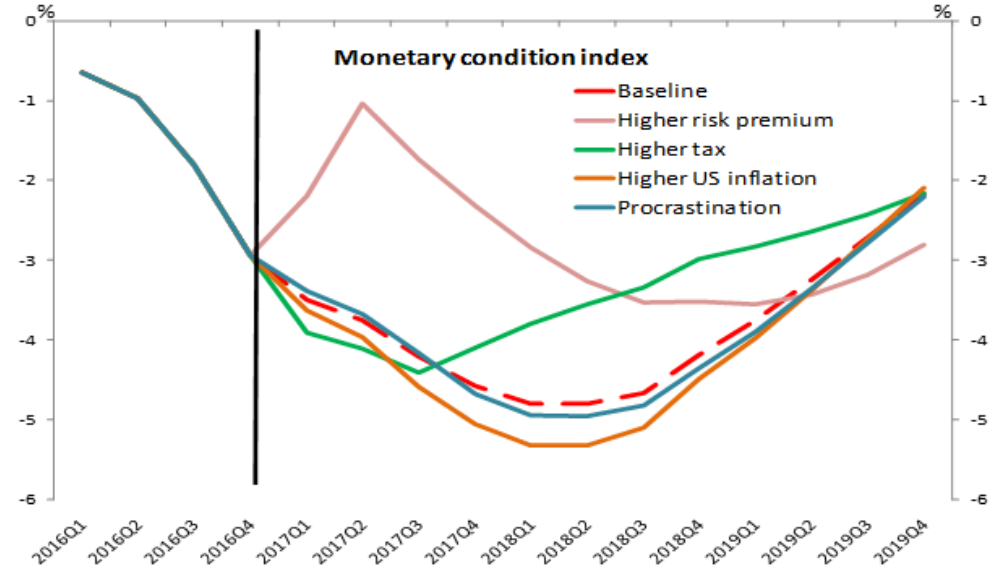
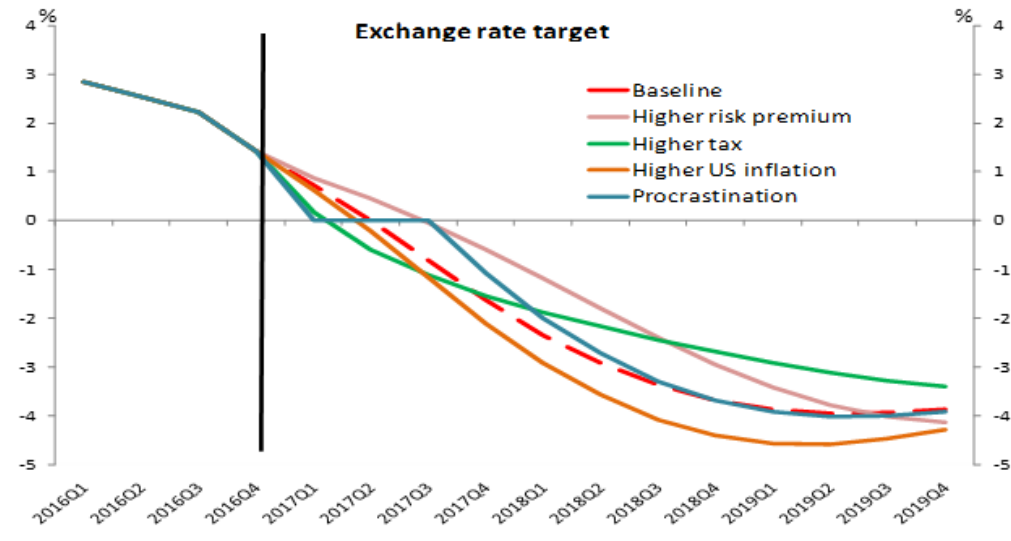
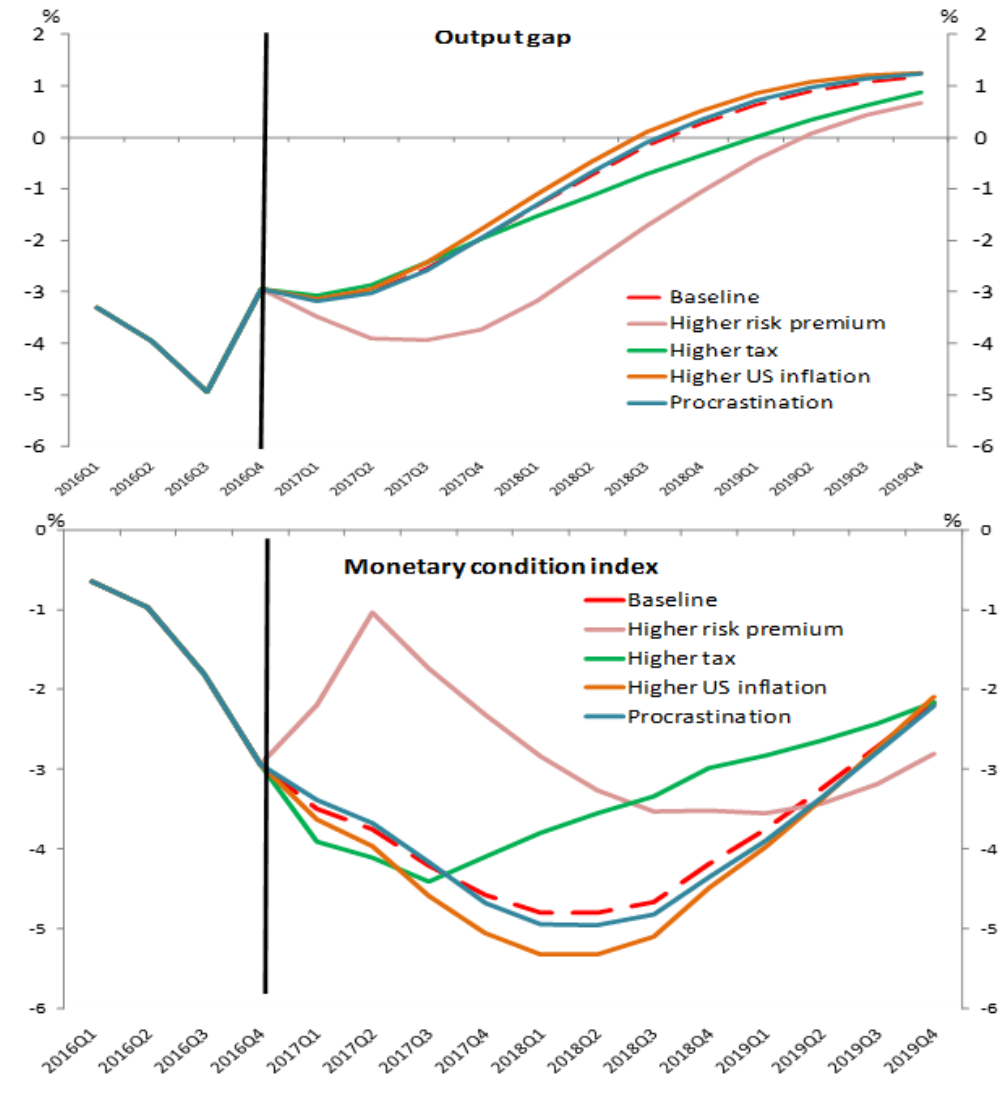
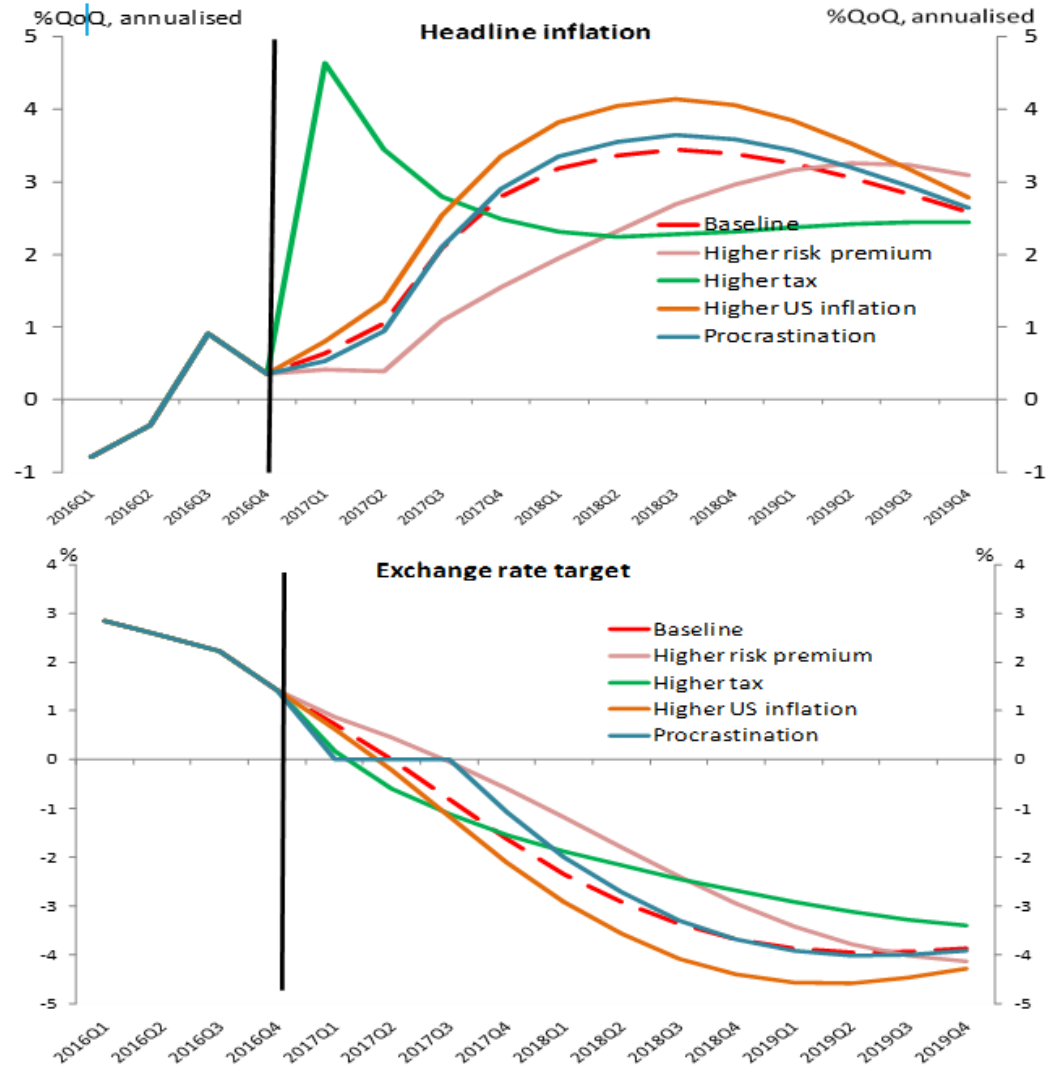


May 2017 Baseline: Decomposition

	2016Q4	2017Q1	2017Q2	2017Q3	2017Q4	2018Q1	2018Q2	2018Q3	2018Q4	2019Q1
<i>Policy Rate (% p.a.)</i>										
March2017 Baseline	25.7	26.1	25.8	24.6	23.3	21.9	20.6	19.5	18.6	17.9
+ Impact of New Data/NTFs	-0.0	-2.6	-2.4	-2.3	-2.2	-2.1	-2.0	-1.9	-1.7	-1.5
May 2017 Baseline	25.7	23.5	23.3	22.3	21.2	19.8	18.6	17.7	17.0	16.4
<i>Headline Inflation (% YoY)</i>										
March2017 Baseline	15.5	13.3	12.4	11.6	10.2	9.7	8.6	8.2	8.1	8.0
+ Impact of New Data/NTFs	-0.0	-0.2	0.2	-0.0	0.2	0.2	-0.0	0.2	0.1	0.2
May 2017 Baseline	15.5	13.1	12.6	11.6	10.4	9.9	8.6	8.3	8.2	8.1



Alternative scenarios and risk assessment



FPAS is a long-term investment

- **It typically takes 2-3 years** (in a central bank environment) to adopt a fully-fledged FPAS
- It requires investment in
 - customized technology development
 - people's capacity for macroeconomic analysis and forecasting
 - link to CAL's existing analytical system

Where does the training by Inclusive Analytics fit here?

- Three training sprints to be delivered over three months
- Training will support the development of three core FPAS components and the basic capabilities to operate them in the CAL's business context

Training	FPAS component covered by the training
Macroeconomic analysis (this week)	Data monitoring system
Macroeconomic modelling and forecasting tools (March)	Near-term forecasting system
Forecasting bootcamp (April)	Medium-term forecasting system

- Additional specialised training may include: Principles of dynamic macroeconomic modelling (model design, estimation, validation, implementation), Dynamic Stochastic General Equilibrium modelling, coding in Matlab, coding in IRIS,



Thank you